

Research Project: Wood-Smoke Quantification along the Wasatch Front

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Problem Statement

Exposure to wood-smoke is associated with increased human health hazards. Wood combustion emits a variety of air pollutants, such as polycyclic aromatic hydrocarbons, several of which are toxic or carcinogenic. A preliminary analysis of two-wavelength black carbon (BC) aethalometer data, collected in West Valley during 2011-2012 by Sonoma Tech Inc., showed that wood-smoke emissions are associated with increased levels of fine particulate matter (PM_{2.5}) during winter. Wood burning emissions were estimated from BC measurements based upon the enhanced absorption of wood-smoke at UV wavelengths relative to that of BC. Wood-smoke emissions also displayed a seasonal and diurnal pattern, consistent with expected trends for domestic heating emissions. However, collected BC data were limited to West Valley. Furthermore, while aethalometer measurements are a specific indicator of wood-smoke related PM, these measurements are not quantitative. Further research is therefore needed to quantify wood combustion emissions and their contribution to PM_{2.5} in non-attainment areas along the Wasatch Front during winter-time inversions.

Specific tasks

UDAQ will conduct a study for measuring wood-smoke emissions in non-attainment areas during winter of 2015-2016. 24-hour average PM_{2.5} concentrations will be measured at distinct sampling sites along the Wasatch Front. Collected samples will be analyzed for chemically speciated species, including levoglucosan. The latter is a molecular tracer for wood burning. The contribution of wood-smoke to PM_{2.5} will be determined using measurements of levoglucosan and either levoglucosan-to-wood-smoke mass conversion factors or positive matrix factorization.

Deliverables

Findings from the projected study will help determine:

- Wood-smoke emissions and their contribution to PM_{2.5}
- Spatial variation in wood-smoke emissions
- Association of wood-smoke emissions with high PM_{2.5} levels during exceedance days
- Variation of wood-smoke emissions with wind speed/direction and temperature

Results will also be compared to county emission inventories, compiled by UDAQ.

Next steps

These findings will help UDAQ establish more effective and rationally-targeted control regulations for reducing wood-smoke emissions and their contribution to elevated PM_{2.5} levels.

Additional Resources

Sonoma Technology Inc., [Mountain View Corridor Air Quality Study](#).